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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/806,114	03/23/2004	Shaoping Li	50103-561	2142

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EXAMINER	
BERNATZ, KEVIN M	

ART UNIT	PAPER NUMBER
1773	

DATE MAILED: 05/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/806,114	LI ET AL.	
	Examiner	Art Unit	
	Kevin M. Bernatz	1773	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Amendments to the specification and claims 1 and 22, filed on March 15, 2006, have been entered in the above-identified application.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 102

3. Claims 1 – 5, 9 – 12, 15, 16 and 19 – 25 are rejected under 35 U.S.C. 102(e) as being anticipated by Girt et al. (U.S. Patent No. 6,777,112 B1) for the reasons of record as set forth in Paragraph No. 7 of the Office Action mailed on December 15, 2005.

Claim Rejections - 35 USC § 103

4. Claims 1 – 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda et al. (U.S. Patent No. 6,468,670 B1) in view of Oikawa et al. (U.S. Patent App. No. 2002/0136929 A1), Carey et al. (U.S. Patent No. 6,280,813 B1) and applicants' admissions for the reasons of record as set forth in Paragraph No. 11 of the Office Action mailed on December 15, 2005.

5. Claims 1, 2, 4, 5, 9 – 14 and 19 – 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fullerton et al. (U.S. Patent No. 6,383,668 B1) in view of Oikawa et al. ('929 A1) for the reasons of record as set forth in Paragraph No. 12 of the Office Action mailed on December 15, 2005.

6. Claims 6 – 8, 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fullerton et al. in view of Oikawa et al. as applied above, and further in view of applicants' admissions for the reasons of record as set forth in Paragraph No. 13 of the Office Action mailed on December 15, 2005.

7. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fullerton et al. in view of Oikawa et al. as applied above, and further in view of Igarashi et al. (U.S. Patent No. 6,635,367 B2) for the reasons of record as set forth in Paragraph No. 14 of the Office Action mailed on December 15, 2005.

Response to Arguments

8. The prior 112 1st and 2nd Paragraph rejections and interpretation of "continuous" and "granular"

The above noted rejection has been withdrawn in view of applicant(s) arguments, which have been found persuasive. Specifically, applicant(s) argue that the amended claims and specification overcome the 112 1st and 2nd Paragraph rejections, which is agreed with by the Examiner. With regard to the interpretation of the term "granular"

and "continuous", applicants appear to argue with the Examiner's interpretation of the term in Paragraph 5 of the Office Action mailed on December 15, 2005. However, the Examiner notes that both applicants and the Examiner appear to be pointing to the same reference (Ikeda et al.) for the interpretation of the term. As such, the Examiner believes that the scope afforded the term by applicants is consistent with the scope afforded the term by the Examiner (i.e. the scope defined by the reference Ikeda et al., for example).

9. The rejection of claims 1 - 25 under 35 U.S.C § 102(e) and/or 103(a) – Girt et al., alone or in view of various references

Regarding the 103(a) rejections, the Examiner notes that these rejections are overcome since Girt et al. per 35 U.S.C. 103(c).

Regarding the rejection under 35 U.S.C. 102(e), applicant(s) argue(s) that Girt et al. "do not suggest the AFC-GC magnetic recording medium wherein the exchange coupling strength in the continuous ferromagnetic stabilizing layer is preselected to be larger than the strength of the anti-ferromagnetic coupling provided by the non-magnetic spacer layer to thereby enhance thermal stability of the recording bits" and that the Examiner's position on the inherency of this feature is flawed (*pages 12 – 13 of response*). The Examiner respectfully disagrees.

The limitation argued above is a functional limitation(s). As defined in the MPEP, "[a] functional limitation is an attempt to define something by what it does, rather than by what it is (e.g., as evidenced by its specific structure or specific ingredients). There is

nothing inherently wrong with defining some part of an invention in functional terms. Functional language does not, in and of itself, render a claim improper. *In re Swinehart*, 439 F.2d 210, 169 USPQ 226 (CCPA 1971)" – MPEP § 2173.05(g). However, the examiner notes that "where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an ***inherent characteristic of the prior art***, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristics relied on" (emphasis added) - MPEP § 2173.05(g).

As noted above, there is nothing improper about claiming an invention based on a function or property. However, these limitations are difficult for the Office to adequately examine since the Office is incapable of performing experiments to determine whether a patent issued based on the functional language would infringe upon an already existing prior art invention. The Office must balance the desire to protect the public from the issuing of two patents directed to the same invention with the desire to provide applicants with a thorough, timely considered and valid patent. Because of these dual requirements, where an Examiner can put forth sound basis that a function or property ***may*** necessarily be present in a prior art invention, a shifting of the burden to applicants is proper. It is not required for the Examiner to definitely prove that the function or property ***always*** is present, but merely to provide sound basis as to why the Examiner believes that such is the case. Such a position balances the benefit to the public by bringing a possible duplicate invention issue to light while also allowing applicants to be sure of obtaining a valid patent.

The Examiner notes that applicants may rebut and disprove the Examiner's sound basis by providing evidence that such a property or functional limitation would not necessarily flow from the claimed structure. Preferably this evidence should be in the form of experimental data or an executed declaration. While attorney arguments are not evidence, convincing attorney arguments may also be sufficient to clarify the issue and overcome the rejection. Presently, the Examiner notes that there is no *evidence* of record that the invention of Girt et al. would not meet the claimed limitations. Regarding applicants' argument that the Examiner has not provided basis for the inherency position, the Examiner points to page 8 of the Office Action mailed December 15, 2005, where the Examiner explicitly stated "Girt et al. disclose specific alloys for the continuous layer, reciting that these alloys comprise a very low amount of non-magnetic material inorder to "insure strong magnetic coupling between adjacent grains"" (emphasis added). Strong magnetic coupling between grains means strong exchange coupling strength in the continuous ferromagnetic stabilizing layer. Furthermore, the Examiner points to Ikeda et al. (*col. 5, lines 49 – 53*) which provides additional supporting evidence that the strength of the antiferromagnetic coupling across the thin non-magnetic spacer layers is weak. Hence, there is sound basis that regardless of the materials used, the exchange coupling from the strongly coupled film will always be stronger than the "weak" antiferromagnetic coupling.

Applicants next argue that the "amount of anti-ferromagnetic (sic) coupling preselected to ensure magnetic relaxation after writing" is an intended use limitation (*page 13 of response*). The Examiner respectfully disagrees.

First, the Examiner notes that the amount of anti-ferromagnetic coupling can be preselected for a large variety of reasons (e.g. to maximize coupling strength, to minimizing coupling between adjacent grains, to resist external magnetic fields, etc). As such, since the coupling strength *can* be varied as readily appreciated by one of ordinary skill in the art, the coupling strength could be preselected to meet the claimed intended use. Second, the Examiner notes that applicants own specification implies that the exchange coupling possessed by the continuous layer ensures relaxation after writing (*page 20 of response*), not the amount of anti-ferromagnetic coupling.

Third, all materials exhibit magnetic relaxation once removed from a magnetic field. This is especially true in a recording medium, where the magnetic layers are exposed to a very large magnetic field during writing to orient the domains in a specific order. The present claims don't recite the length of time the relaxation occurs in, the magnitude of the relaxation, the magnitude of the applied field during writing, etc. As such (to take a far fetched position to illustrate the Examiner's point), applying a 2.4 T magnetic field from a high-density magnetic head to the recording medium and then monitoring the behavior for 10 years, one would reasonably expect that some "magnetic relaxation" would occur over those 10 years. The Examiner acknowledges that the illustration is far fetched, but technically the claims read on such an illustration (i.e. the limitation is immensely broad and, hence, is arguably met by any prior art recording medium). As such, the Examiner cannot justify relying upon such a limitation for patentability when the broadest reasonable interpretation could cover magnetic relaxation occurring over a period of days, months or even years.

10. The rejection of claims 1 - 25 under 35 U.S.C § 103(a) – Ikeda et al. in view of various references

Applicant(s) argue(s) that "Applicants have not admitted that the different types of magnetic recording media are functional equivalents" (*page 15 of response*). The Examiner respectfully disagrees.

The Examiner does not know how else to interpret the language "Referring to FIGS 3 (A) – 3 (D), illustrated therein, in simplified, schematic perspective view, are several possible magnetization configurations of **conventional** AFC media, wherein: Figure 3(A) illustrates a longitudinal medium wherein the direction of magnetic moments of each of the grains of both of the anti-ferromagnetically coupled layers is aligned parallel to the substrate surface ... FIG. 3 (D) illustrates a perpendicular medium, wherein the directions of the magnetic moments of each of the grains of both of the anti-ferromagnetically coupled layers is aligned normal to the substrate surfaces" (emphasis added). It is the Examiner's interpretation that "conventional AFC media" implies that these media are "conventional", and hence well known to one of ordinary skill in the art.

11. The rejection of claims 1 - 25 under 35 U.S.C § 103(a) – Fullerton et al. in view of various references

Applicant(s) argue(s) that "Fullerton et al. do not suggest that the Examiner-asserted second ferromagnetic layer is anti-ferromagnetically coupled with the continuous layer" (*page 17 of response*). The Examiner respectfully disagrees.

To clarify the Examiner's position, the Examiner notes that there are several types of magnetization couplings. Magnetic coupling between two magnetic elements can be broken down into exchange coupling, which is coupling between magnetic elements that are directly or near-directly adjacent (*this can be equated with "conduction" between two thermal bodies*) and magnetostatic coupling, which is coupling between magnetic elements that are not directly adjacent (*akin to "radiation" between two thermal bodies*). Of these coupling types, one can have either *ferromagnetic* coupling, which results in both magnetic elements having magnetic directions that are parallel to each other, and RKKY-type/antiferromagnetic coupling, which results in both magnetic elements having magnetic directions which are anti-parallel to each other.

Looking at the disclose of Ikeda et al. (*particularly Figure 2 and col. 3, lines 53 – 58 and col. 5, lines 49 – 52*), Ikeda et al. state "the top ferromagnetic film **32** is exchange coupled ferromagnetically to the magnetic layer **25**". This means that the magnetization directions of both layers **25** and **32** are in the same direction (see Figure I attached below). Ikeda et al. goes on to recite "and weakly coupled antiferromagnetically to the bottom ferromagnetic film **34** across the spacer layer". This is illustrated in Ikeda et al. Figure 2, as reproduced below. As such, the magnetization directions of both layers 25 and 32 are anti-parallel to the magnetization direction of layer 34. This is the definition of antiferromagnetic coupling/RKKY-type coupling, in that the magnetization directions are anti-parallel to each other. Hence, this is why the Examiner deems that the disclosed structure meets the claimed limitation.

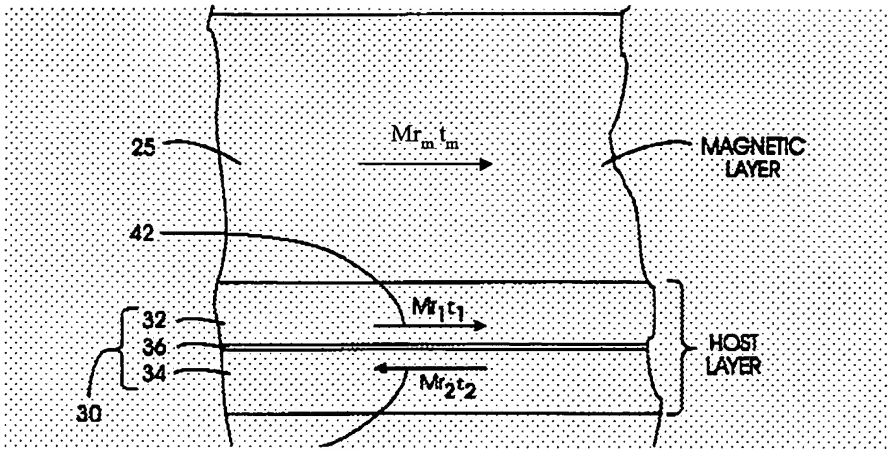

Figure I: Reproduction of part of Ikeda et al. Figure 2

Regarding applicants argument that none of the relied upon references meet the claimed limitation regarding the "exchange coupling strength in the continuous ferromagnetic stabilizing layer is preselected to be larger than the strength of the anti-ferromagnetic coupling provide by the non-magnetic spacer layer to thereby enhance thermal stability", the Examiner's arguments with respect to Girt et al. apply equally here. In addition, the Examiner notes that this limitation was explicitly addressed in the rejection of record (*paragraph bridging pages 19 and 20*).

Conclusion

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M. Bernatz whose telephone number is (571) 272-1505. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carol Chaney can be reached on (571) 272-1284. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KMB
May 11, 2006

Kevin M. Bernatz, PhD
Primary Examiner